

## Supporting Movie Captions

**Mov. S1: Qualitative mechanical properties of the vesicles.** Three clay vesicles can be seen in this image. A 10  $\mu\text{m}$  diameter glass capillary was used to prod the vesicle. A small permanent plastic deformation is seen at the point of contact between the capillary and the vesicle wall. Scale bar 30  $\mu\text{m}$  (MOV, 1.24 MB).

**Mov. S2: Qualitative mechanical properties of the vesicles.** A clay vesicle is subject to extensive deformation with a glass capillary. The vesicle deforms plastically. Scale bar 20  $\mu\text{m}$ . (MOV, 650 KB)

**Mov. S3: Time-lapse confocal fluorescence microscopy movie of enclosed oleate structures in a clay vesicle.** Dynamic oleate membranes can be observed fluctuating and diffusing, while the rigid clay vesicle walls do not move. At  $t=170.1$  s an oleate liposome can be seen hitting the clay vesicle wall and bouncing back. The black line tracks the trajectory of the liposome. Scale bar 10  $\mu\text{m}$ . (MOV, 605 KB)

**Mov. S4: Confocal fluorescence microscopy Z-stack of a clay vesicle shown in Fig. 4G.** Liposomes of various shapes and sizes can be seen in the interior and exterior of the clay vesicle. The clay vesicle here is nonspherical and the vesicle boundary is seen as the continuous red line. Scale bar 10  $\mu\text{m}$ . Z-spacing 1  $\mu\text{m}$ . (MOV, 1.19 MB)